

CONTENTS

INTRODUCTION	
BY MATTHEW BECKLER.....	2
PROJECT 1: FOUR SIMPLE PROJECTS	
BY LENORE EDMAN AND WINDELL OSKAY.....	24
PROJECT 2: THE DESKTOP UFO	
BY JAMES FLOYD KELLY	46
PROJECT 3: THE CHEATER’S DICE ROLLER	
BY JOHN BAICHTAL.....	64
PROJECT 4: COLOR-CODED LED WATCH	
BY JOHN BAICHTAL.....	80
PROJECT 5: REAL-TIME MUSIC VISUALIZER	
BY MICHAEL KRUMPUS	94
PROJECT 6: AUTOMATED INFRARED REMOTE CONTROL	
BY KAAS BAICHTAL.....	110
PROJECT 7: STARFIELD LIGHT EFFECT BOX	
BY ADAM WOLF.....	132
PROJECT 8: OPTICAL SCREWDRIVER	
BY JOHN BAICHTAL.....	146
PROJECT 9: WEARABLE TIMING BRACER	
BY MIKE HORD.....	166
PROJECT 10: WEARABLE LED TEXT-SCROLLING SASH	
BY KRISTINA DURIVAGE.....	182
APPENDIX: GETTING STARTED WITH SOLDERING	
BY MATTHEW BECKLER.....	219

CONTENTS IN DETAIL

INTRODUCTION

BY MATTHEW BECKLER.....	2
ALL ABOUT LEDS	2
HOW LEDS WORK	3
LED CONFIGURATIONS.....	4
READING AN LED DATASHEET	7
RESISTANCE, LEDS, AND OHM'S LAW	8
CALCULATING RESISTANCE TO USE WITH AN LED	9
LEDS IN THE WORLD.....	11
GETTING STARTED WITH THE RASPBERRY PI	13
WHAT YOU'LL NEED	13
INSTALLING RASPBIAN WITH NOOBS.....	14
PREPARING THE SD CARD	14
STARTING UP YOUR PI.....	15
GETTING STARTED WITH THE ARDUINO AND THE ARDUINO IDE.....	15
WHAT IS ARDUINO?.....	16
INSTALLING AND USING THE ARDUINO IDE.....	16
WHAT AN ARDUINO SKETCH LOOKS LIKE	17
CONFIGURING YOUR BOARD AND PORT.....	19
RECOMMENDED SUPPLIERS	21
UNITED STATES.....	21
EUROPE.....	22
ASIA	22

PROJECT 1: FOUR SIMPLE PROJECTS

BY LENORE EDMAN AND WINDELL OSKAY	24
#1: LED-LIT SEA URCHINS	26
GET THE PARTS	26
BUILD IT	27
#2: EDGE-LIT HOLIDAY CARDS	27
GET THE PARTS	28
BUILD IT	28
TAKE IT FURTHER	33
#3: DARK-DETECTING LED.....	34
GET THE PARTS	35
HOW IT WORKS	36

BUILD IT	36
TAKE IT FURTHER	38
#4: ELECTRIC ORIGAMI	38
GET THE PARTS	39
BUILD IT	39
TAKE IT FURTHER: THE DIRECT TONER METHOD	45
SUMMARY	45

PROJECT 2: THE DESKTOP UFO BY JAMES FLOYD KELLY.....

BY JAMES FLOYD KELLY.....	46
GET THE PARTS	48
COMPONENTS	48
TOOLS.....	49
INTRODUCING THE NEOPIXEL.....	49
BUILD IT.....	50
PREPARING THE TRINKET	50
WIRING THE ELECTRONICS	52
TROUBLESHOOTING.....	55
CREATING THE UFO BODY AND LANDING PADS.....	55
ASSEMBLE IT.....	57
TAKE IT FURTHER	63
SUMMARY	63

PROJECT 3: THE CHEATER'S DICE ROLLER BY JOHN BAICHTAL

BY JOHN BAICHTAL	64
GET THE PARTS	66
COMPONENTS	66
TOOLS.....	66
INTRODUCING THE LED MATRIX.....	67
BUILD IT.....	68
CODE IT	71
ASSEMBLE IT.....	76
LASER-CUT YOUR OWN ENCLOSURE.....	76
ALTERNATE ENCLOSURES.....	78
USE IT	79
SUMMARY	79

PROJECT 4: COLOR-CODED LED WATCH	
BY JOHN BAICHTAL	80
GET THE PARTS	82
COMPONENTS	82
TOOLS.....	83
INTRODUCING THE REAL-TIME CLOCK MODULE.....	83
HOW IT WORKS: COLOR-CODING THE LEADS.....	84
BUILD IT.....	85
CODE IT	89
SUMMARY	93
PROJECT 5: REAL-TIME MUSIC VISUALIZER	
BY MICHAEL KRUMPUS	94
GET THE PARTS	96
HOW IT WORKS: TURNING MUSIC INTO DATA.....	97
INPUT BIAS	98
SENSITIVITY CONTROL	99
BUILD IT.....	101
CODE IT	104
HOW IT WORKS	104
GET THE CODE.....	107
USE IT	107
TAKE IT FURTHER	108
SUMMARY	109
PROJECT 6: AUTOMATED INFRARED REMOTE CONTROL	
BY KAAS BAICHTAL	110
HOW IT WORKS: INFRARED LIGHT	112
INFRARED LEADS.....	112
LINE-OF-SIGHT COMMUNICATIONS	113
DATA TRANSMISSION	114
GET THE PARTS	115
BUILD IT.....	117
TAKE IT FURTHER	129
SUMMARY	131

PROJECT 7: STARFIELD LIGHT EFFECT BOX	
BY ADAM WOLF	132
GET THE PARTS	134
COMPONENTS	134
TOOLS.....	135
BUILD IT.....	135
CODE IT	140
SUMMARY	144

PROJECT 8: OPTICAL SCREWDRIVER	
BY JOHN BAICHTAL	146
BUILD THE BASIC SCREWDRIVER.....	148
GET THE PARTS.....	149
ASSEMBLE THE CIRCUIT	149
CODE IT	150
BUILD THE TEST RIG.....	152
BUILD THE WAND VERSION WITH AN ATTINY85.....	154
GET THE PARTS.....	154
FLASHING THE ATTINY85	155
BUILD THE ATTINY85 SCREWDRIVER	156
CODE IT	158
MAKE A PCB WAND.....	158
GET THE PARTS.....	159
BUILD IT	160
SUMMARY	165

PROJECT 9: WEARABLE TIMING BRACER	
BY MIKE HORD	166
GET THE PARTS	168
COMPONENTS	168
CRAFTING SUPPLIES.....	168
TOOLS.....	169
BUILD IT.....	169
CODE IT	175
USE IT	180
SUMMARY	181

PROJECT 10: WEARABLE LED TEXT-SCROLLING SASH BY KRISTINA DURIVAGE	182
GET THE PARTS	184
COMPONENTS	184
TOOLS.....	184
BUILD IT.....	185
GETTING POWER: REPLACING THE PLUG ON YOUR BATTERIES.....	185
ATTACHING A VOLTAGE REGULATOR	190
CONNECTING THE PARTICLE PHOTON BOARD	196
WIRING THE LED ARRAY.....	198
CODE IT	200
CONNECTING THE PHOTON TO WI-FI	200
CODING THE PHOTON.....	201
CODING THE SERVER TO SEND MESSAGES THROUGH TEXTS	205
ASSEMBLE IT.....	208
GATHERING THE MATERIALS.....	208
CONSTRUCTING THE SASH.....	210
SEWING THE BATTERY AND VOLTAGE REGULATOR POCKET	213
SEWING THE LED ARRAY POCKET.....	215
SEWING THE PHOTON POCKET	216
ADDING WIRE STRAPS.....	217
SUMMARY	218
 APPENDIX: GETTING STARTED WITH SOLDERING BY MATTHEW BECKLER	 219
SOLDERING TOOLS	220
HOW TO SOLDER IN SIX STEPS	220
KEEPING THE IRON'S TIP CLEAN.....	221
ADDITIONAL RESOURCES	222